

PSYCHOLOGY 305

COGNITIVE PROCESSES

Attention (p272-301)

1. What is attention
2. When does attention kick in: Early versus late selection?
3. How: Feature Integration Theory (FIT)
4. Spatial neglect

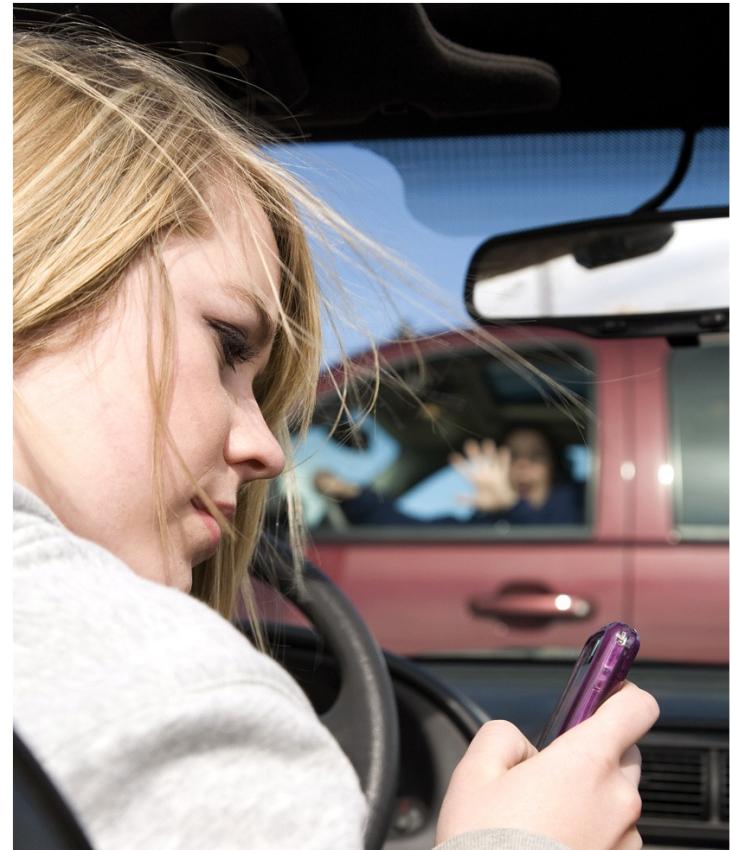
Attention!

**Drive Now
Talk Later**



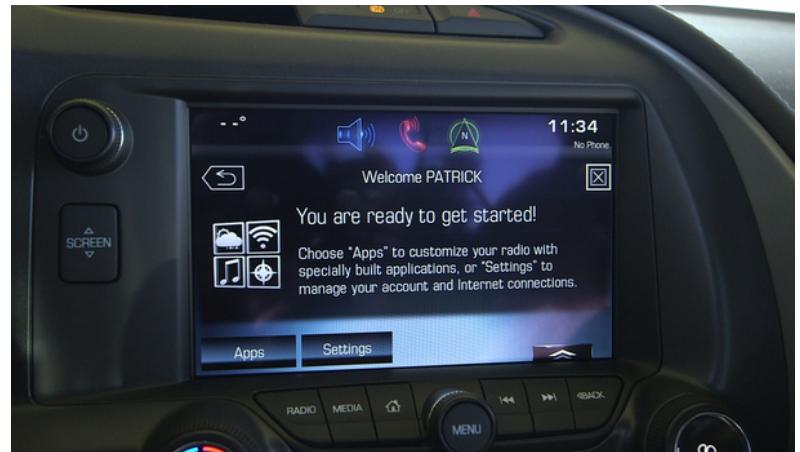
Driving & Cell Phone

- Redelmeier & Tibshirani
(The New England Journal of Medicine, 1997)
 - “The risk of a collision when using a cellular phone was four times higher.”
 - “... result from a driver’s limitations with regard to **attention** rather than dexterity”



Connected Car, What THE...

- National Highway Traffic Safety Administration (NHTSA)
 - Driving while texting is six times more dangerous than driving drunk
 - more than 800,000 vehicles are being driven by someone using a cell phone at any given moment during daylight hours
- AT&T survey
 - 98% say texting or emailing while driving is unsafe, whereas 49% do it anyway,



At 2:00 in the morning on 25 January 1995, Boston police officer Kenny Conley was chasing a shooting suspect.... An undercover officer named Michael Cox had arrived on the scene moments earlier, but other officers had mistaken him for a suspect, assaulted him from behind, and brutally beat him. Conley chased the suspect over the fence and apprehended him some time later. In later testimony, Conley said that he ran right past the place where Cox was under attack, but he claimed **not to have seen** the incident. Nobody believed this and Conley was convicted of perjury and obstruction of justice and was sentenced to thirty-four months in jail (Lehr 2009).

Kenny Conley



Union College psychology professor Chris Chabris:

Officer Conley may have been essentially blind to unexpected events that he otherwise would have seen easily, while his attention was focused on the suspect he was chasing,

Chris Chabris



To understand

- Problems with distracted driving
- Why and how COULD officer Conley be innocent?

Let's talk about Attention

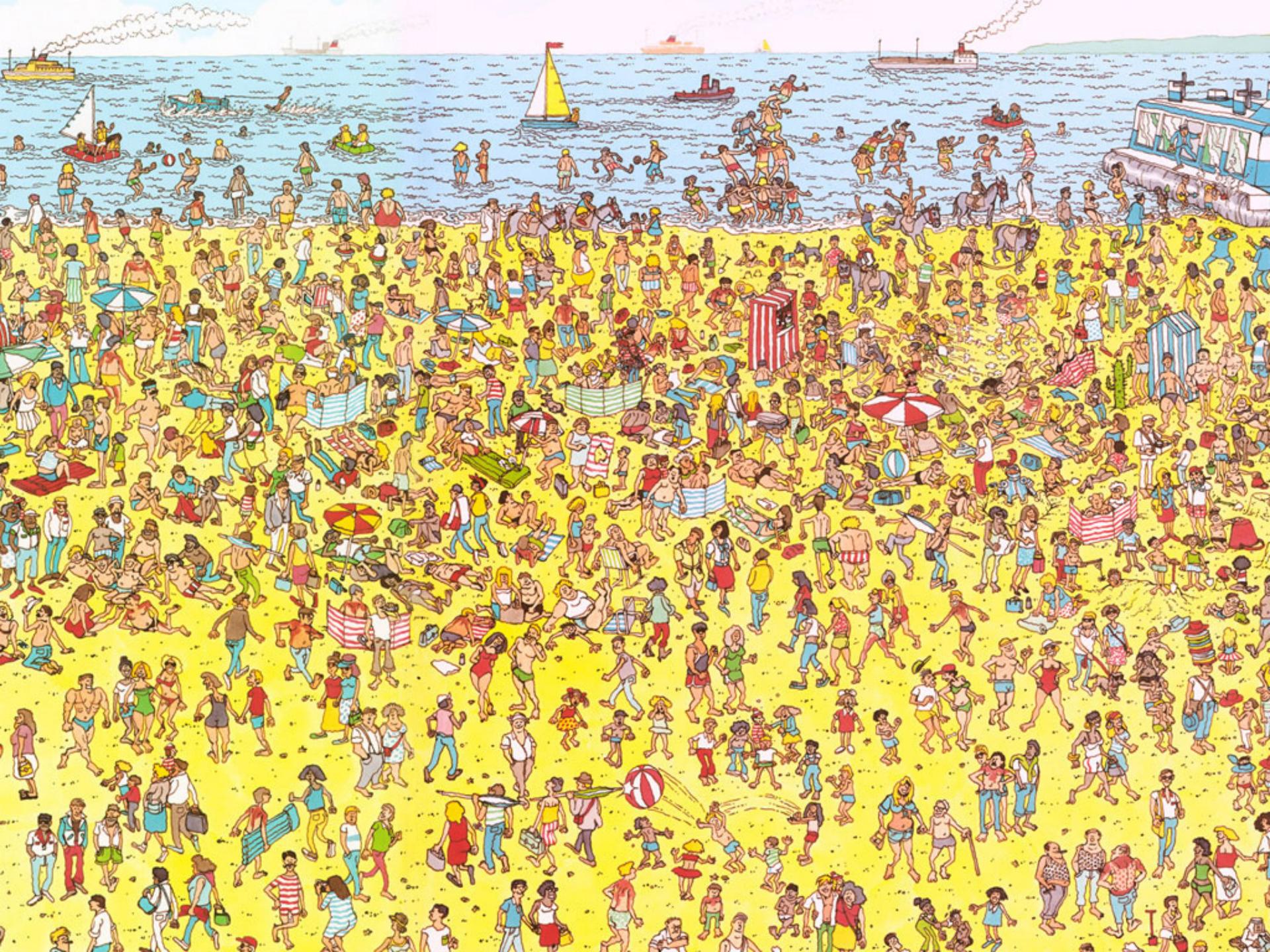
Do I have your ATTENTION?

Where is Waldo?

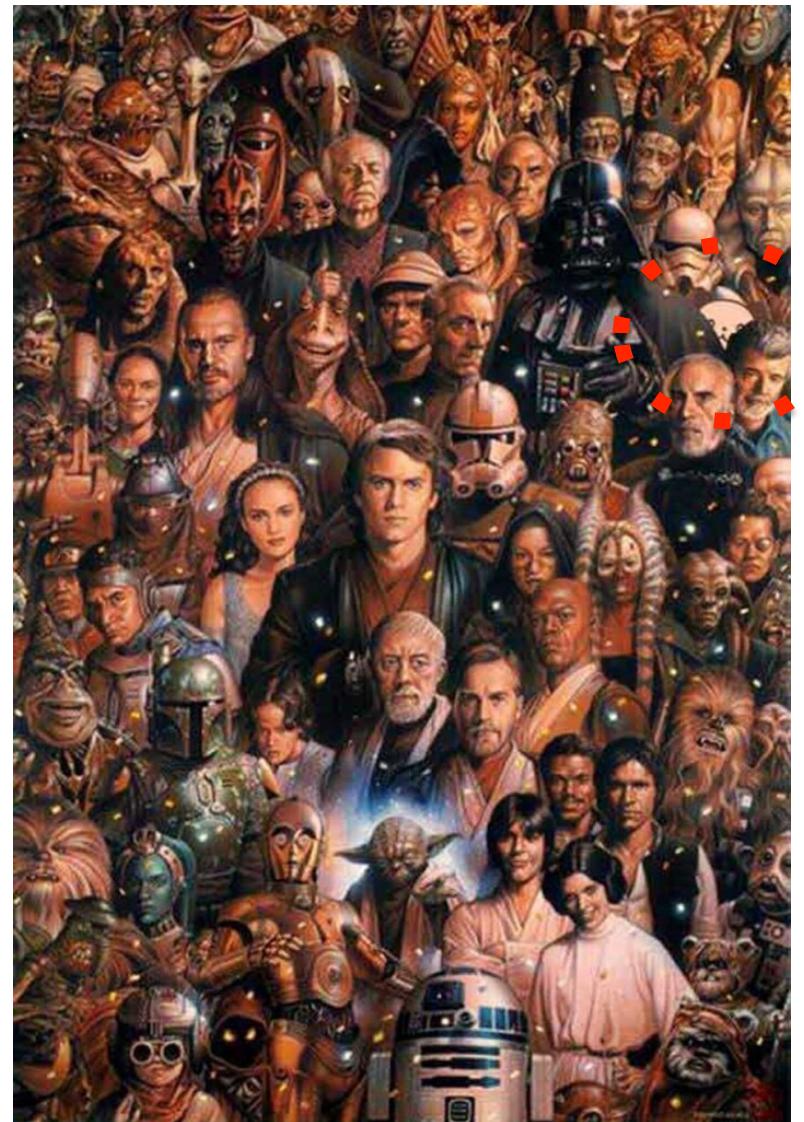
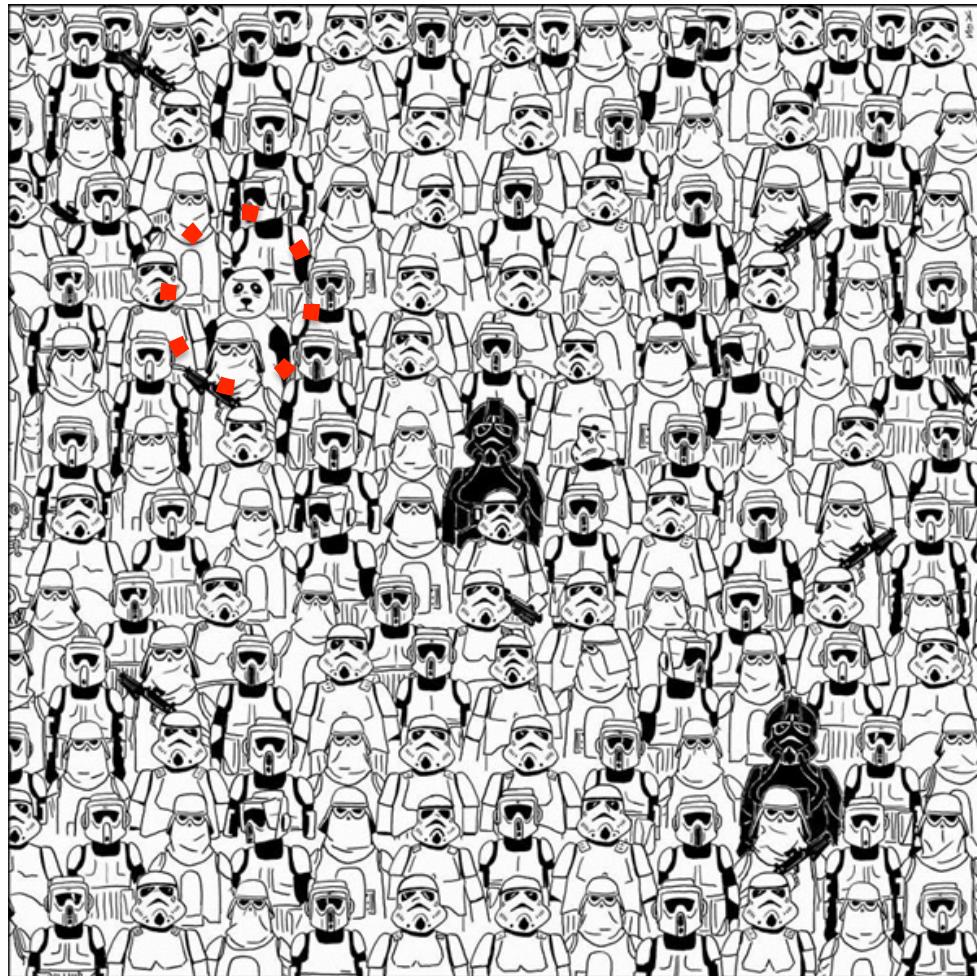


Clap your hands when
you find him





Finding Panda



What is attention?

“Everyone knows what attention is. It is the taking possession of the mind, in clear and vivid form, one out of what seem several simultaneously possible objects or trains of thought. Focalization, concentration of consciousness are of its essence. It implies withdrawal from some things in order to deal effectively with others....” William James (1890)

“Attention is defined as an improvement in the ability to discriminate, detect, or memorize an attended object relative to an unattended object.” (Gottlieb, 2002)

“Attention is a cognitive brain mechanism that enables one to process relevant inputs, thoughts, or actions while ignoring irrelevant or distracting ones”. -from book.

- We have a *limited capacity* to process information.
- Therefore there is *competition* between items for processing.
- Attention is the mechanism that selects the most important/ behaviorally relevant information at the cost of others.

What is attention?

- *William James* – taking possession of the mind, concentration of consciousness
- *Gottlieb* – improvement in the ability to discriminate detect or memorize attended object
- *Book* – mechanism that enables one to process relevant inputs, thoughts, or actions while ignoring others



- We have a *limited capacity* to process information.
- Therefore there is *competition* between items for processing.
- Attention is the mechanism that selects the most important/ behaviorally relevant information at the cost of others.

What is attention for?

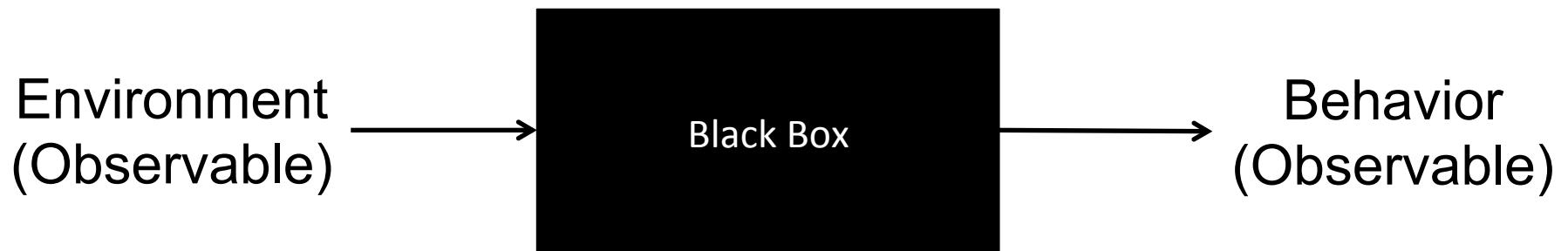
- We have limited capacity to process sensory information.
- Sensory overload



Dave Sullivan

Reflexive attention

- Automatic orienting of attention toward a stimulus



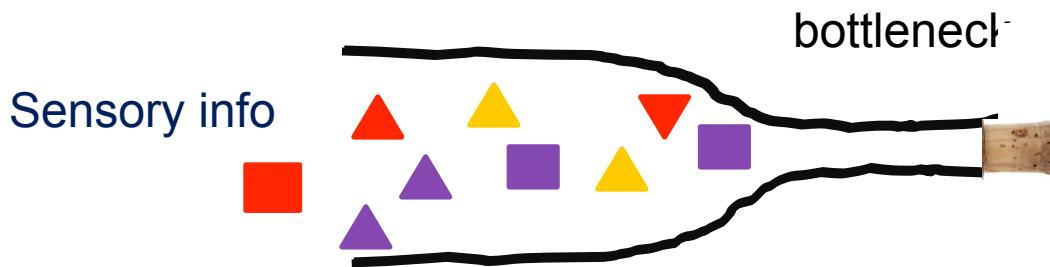
?



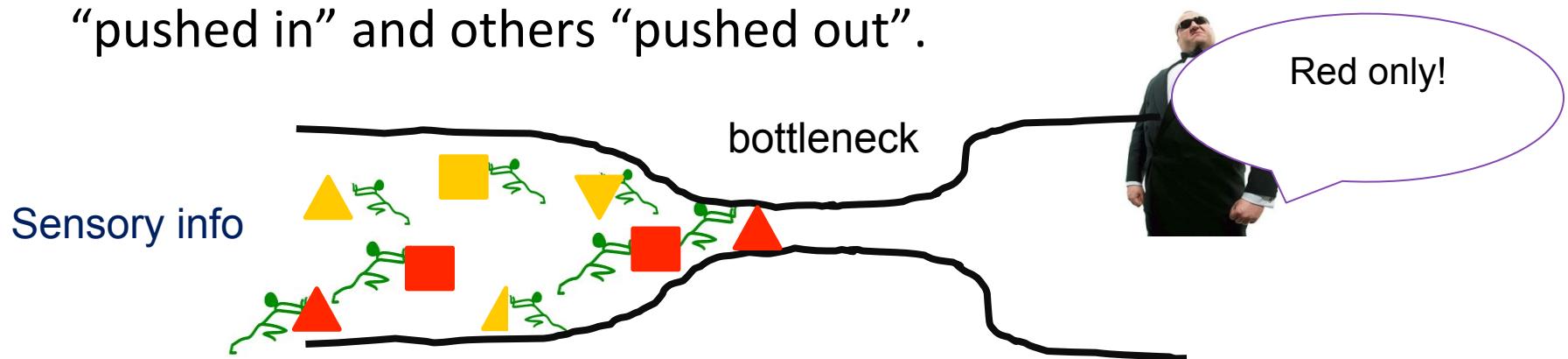
Two mechanisms of selection

- Voluntary attention : select information relevant to current goals and ignore irrelevant information (top-down).
 - Finding Waldo.
- Reflexive attention: re-orienting towards unexpected, but potentially important information.
 - Turning towards sound of sirens.
 - Flashy online ads

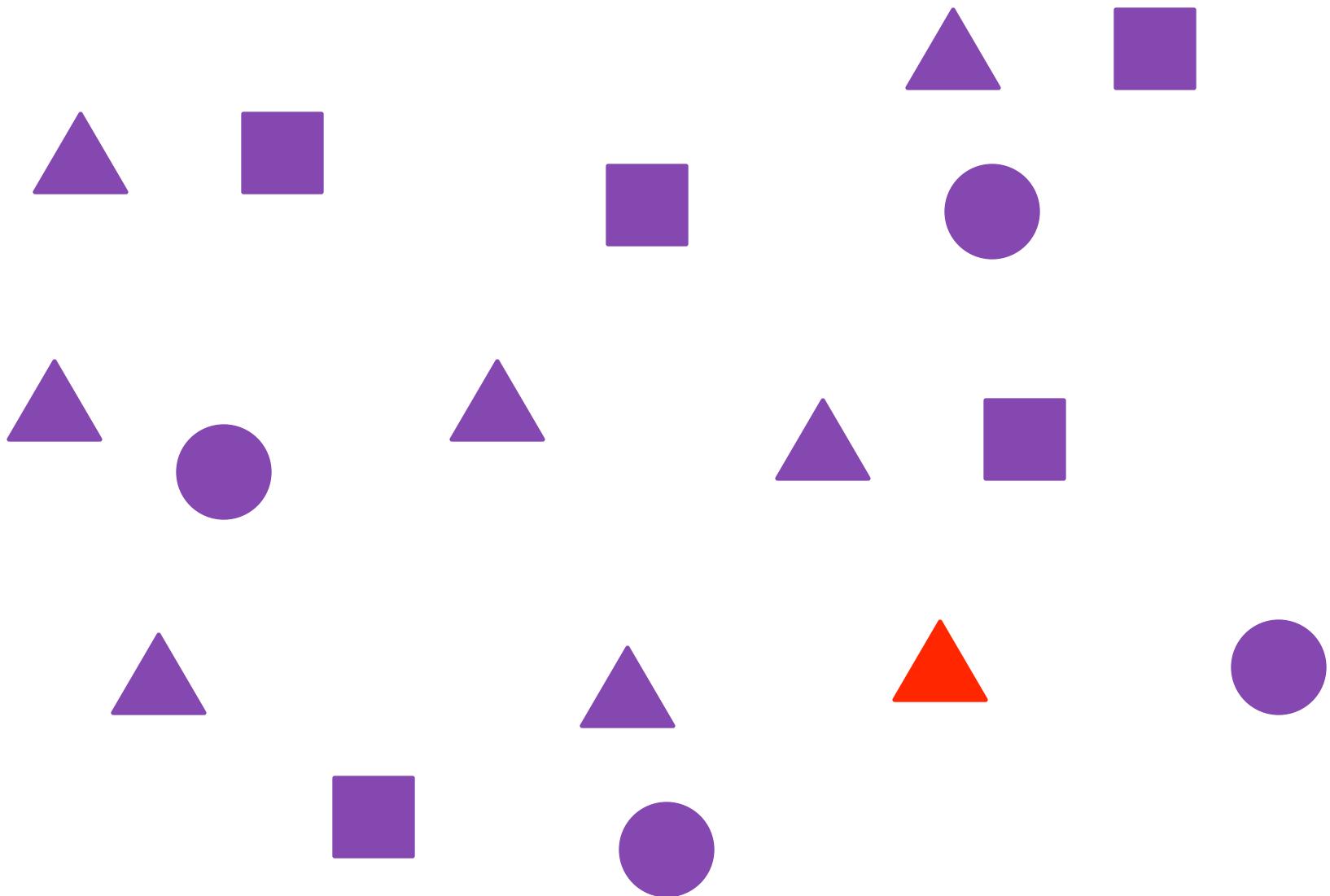
Limitations in processing can be described as a “bottleneck”

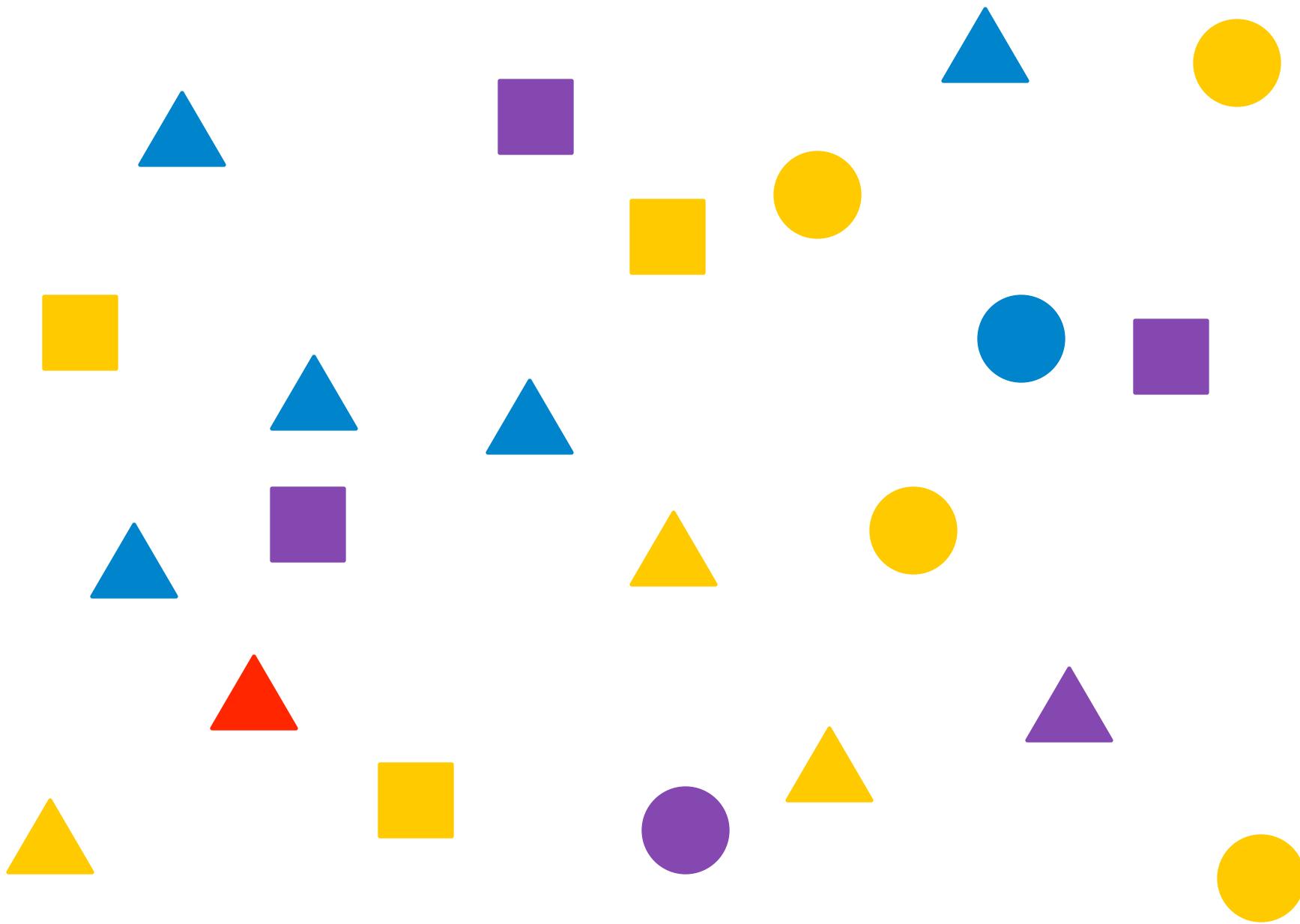


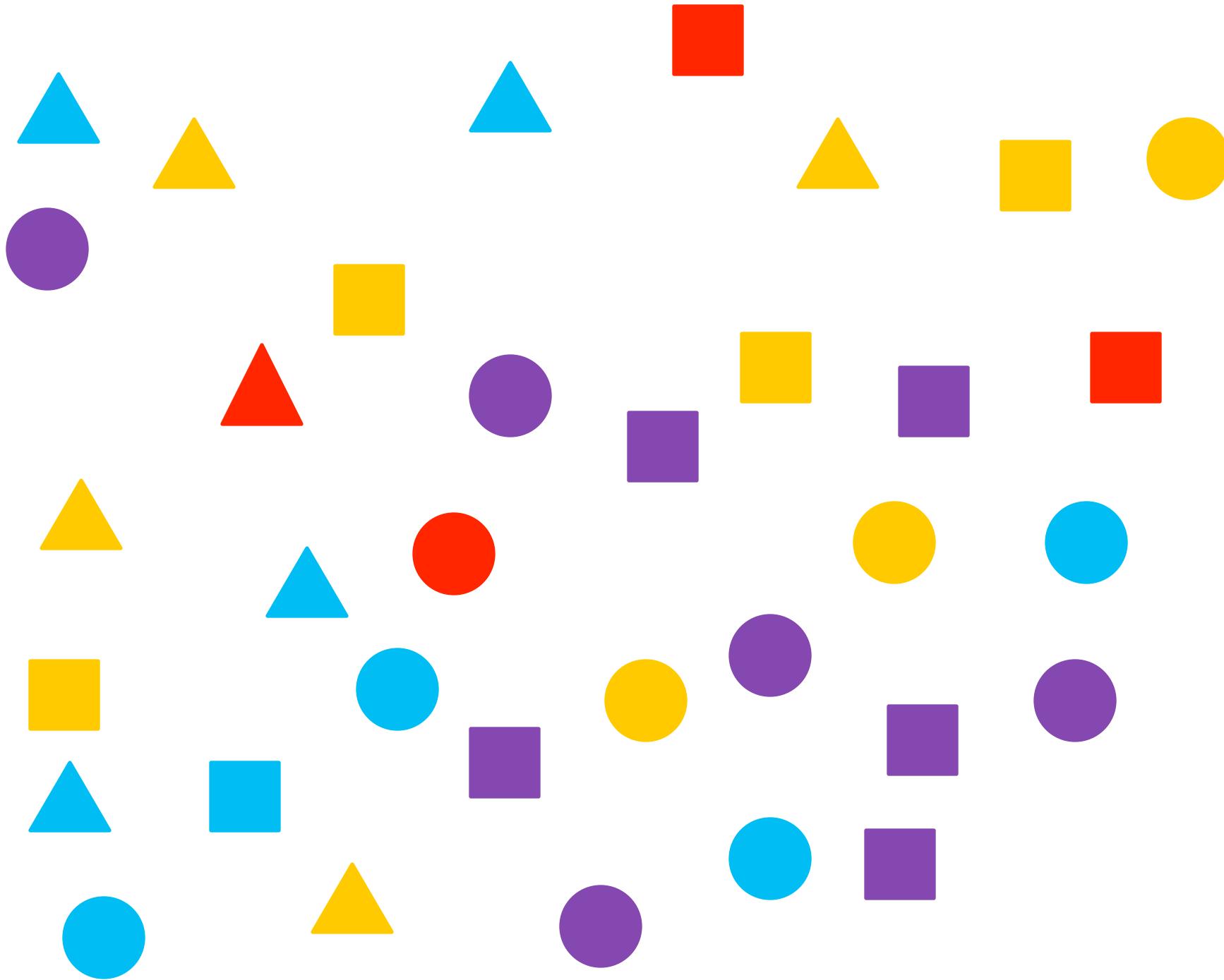
Attention is the process by which some things get “pushed in” and others “pushed out”.

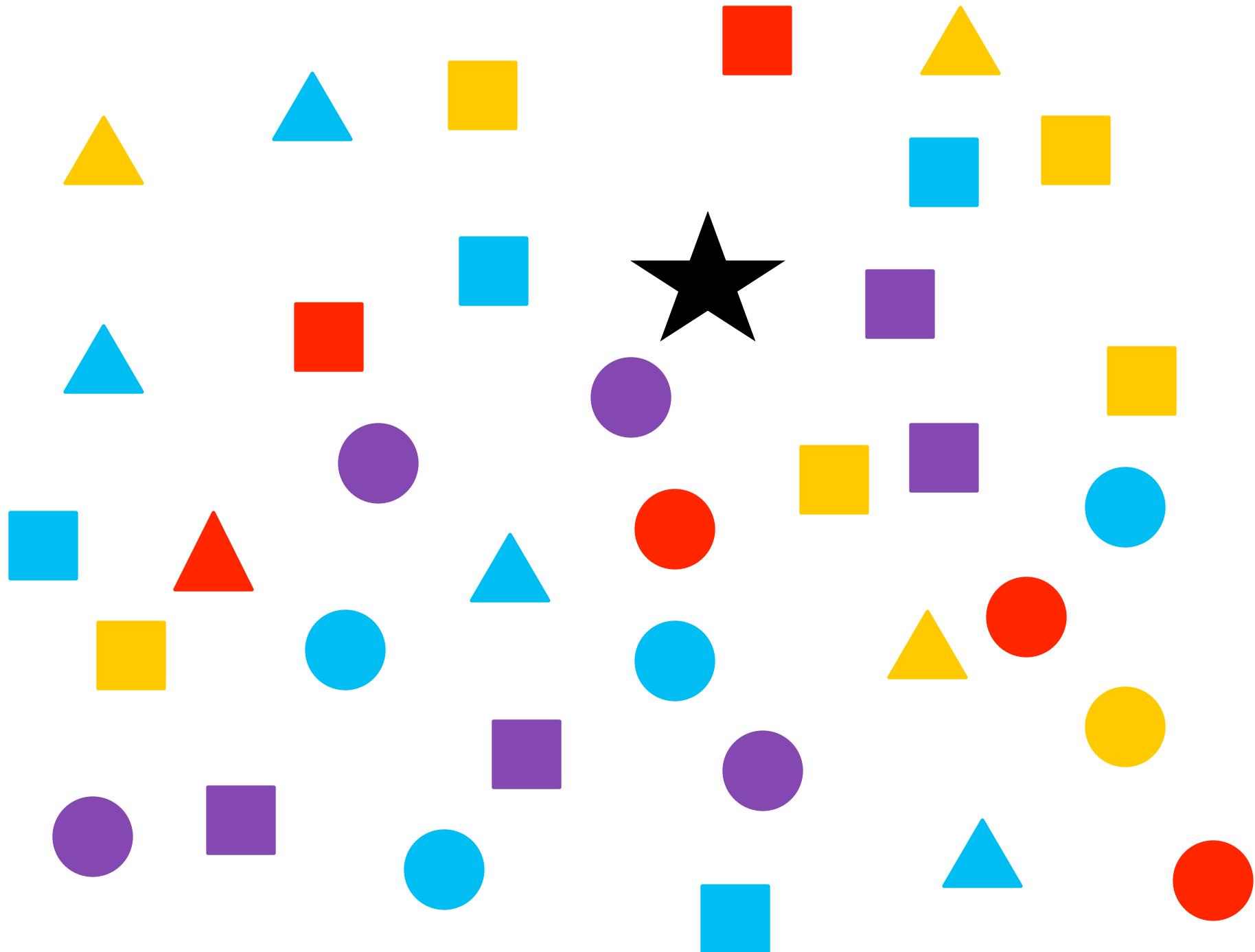


Find red triangle







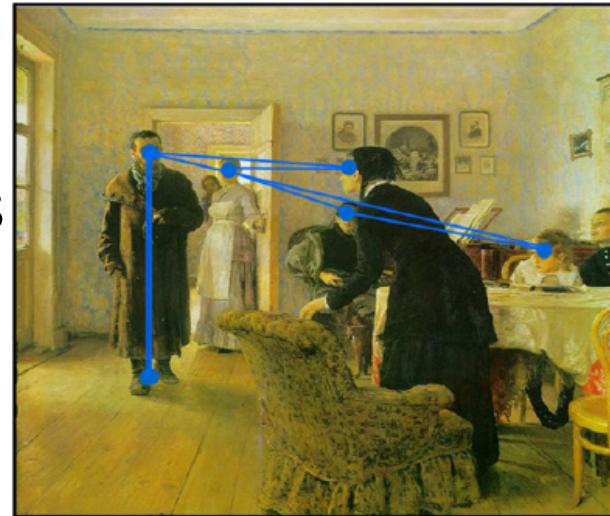


What Grabs Your Attention?

- Where were the yellow circles located?
 - Capacity limits
- Black star?
 - Reflexive attention
- How did you locate the red triangle?
 - Voluntary attention
 - Eye-movements

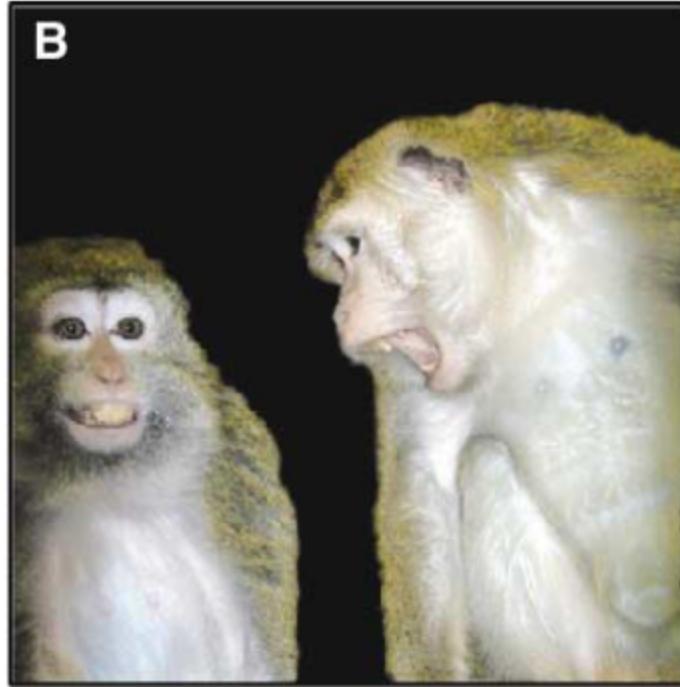
Eye Movements and Visual Attention

- We can see details only at the center of gaze
- We therefore make frequent eye movements to bring information into high resolution fovea and inspect objects of interest
 - Approximately 3 per second during scene viewing
 - This is called “**overt**” attention



But we don't always move our eyes when we shift our attention.

What are you looking at?



Moore et al. 2003

Eye movement, thus overt attention, is too slow

But we don't always move our eyes when we shift our attention.

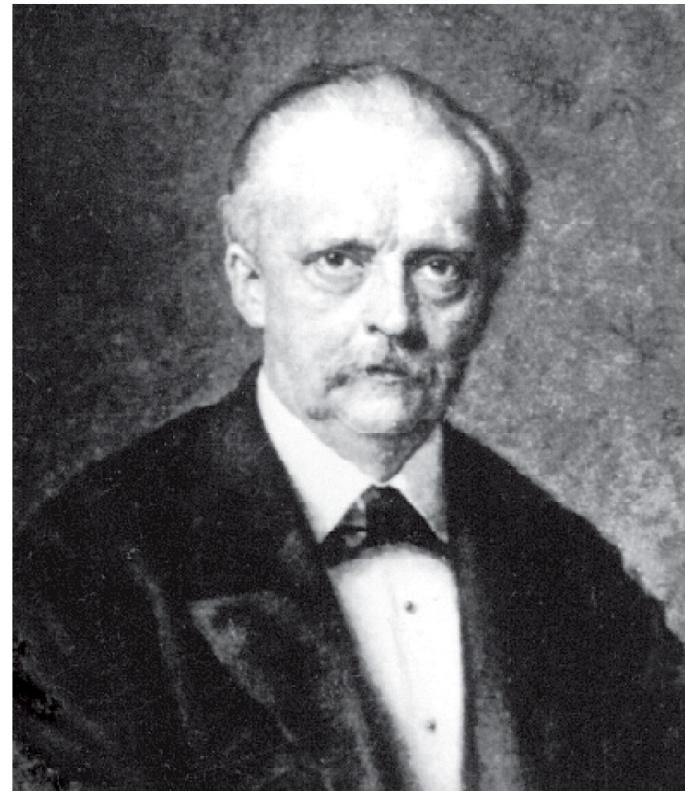
Covert attention – attention to stimulus you are not looking at



Helmholtz's visual attention experiment

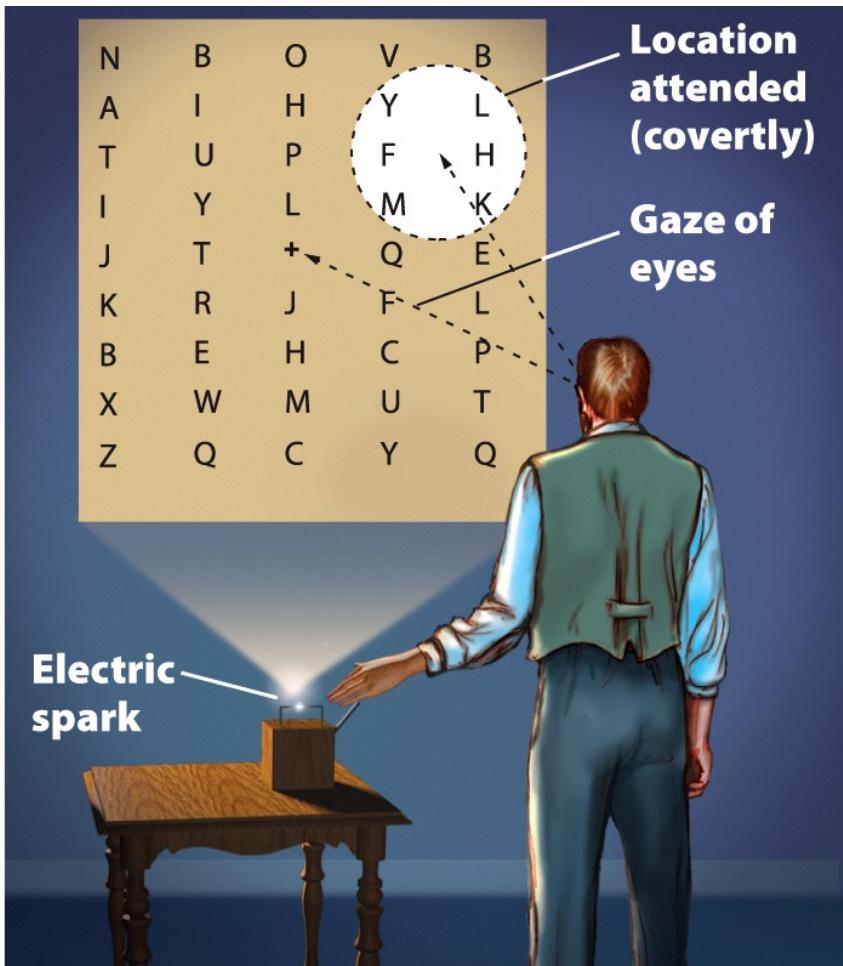
- Covert attention
(without eye movements) is also possible

Hermann von Helmholtz (1821–1894)

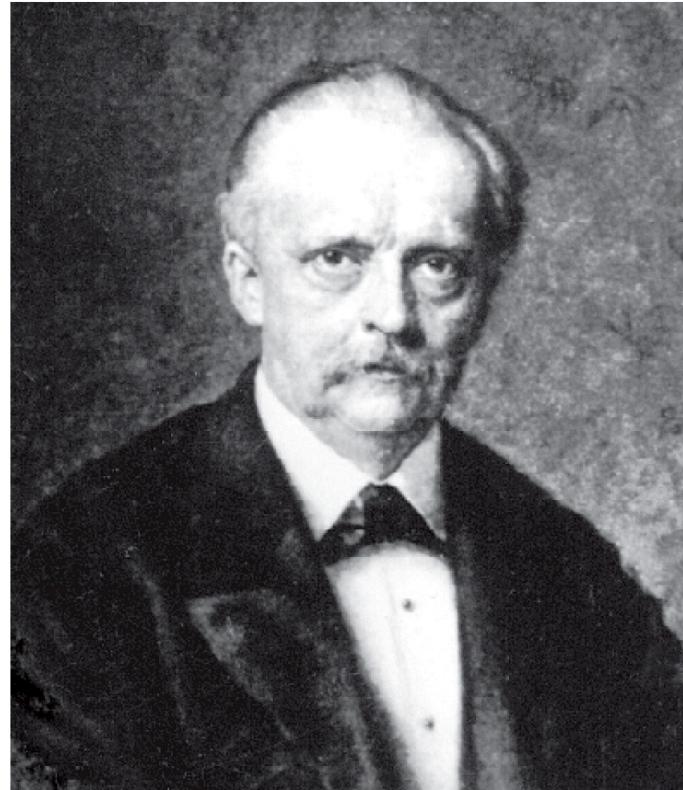


Bettmann/Corbis

Helmholtz's visual attention experiment



Hermann von Helmholtz (1821–1894)



Bettmann/Corbis

could covertly attend to any location on the screen and perceive the letters located within this region but had difficulty perceiving the letters at other locations.

Covert selection

X	X	X	X	X
X	X	X	X	X
X	X	X	X	X
X	X	X	X	X
X	X	+	X	X
X	X	X	X	X
X	X	X	X	X
X	X	X	X	X
X	X	X	X	X
X	X	X	X	X

- Helmholtz experiment

Covert selection

N	U	P	M	O
M	L	Y	A	P
B	O	T	R	K
V	K	H	C	H
C	J	+	U	U
X	H	E	S	I
Z	G	W	H	L
A	F	Q	N	B
S	D	Y	I	E

- Helmholtz experiment

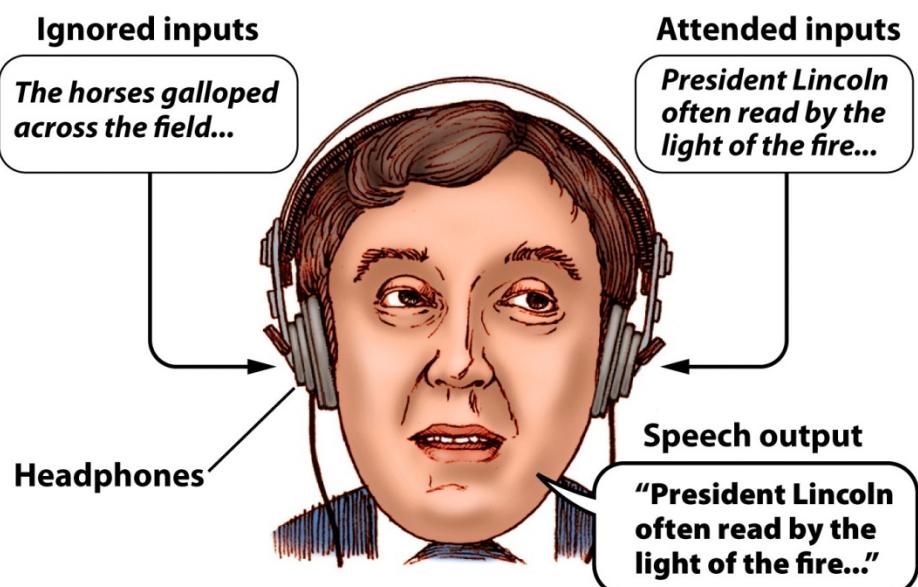
What letters did you see?



Covert selection

Dichotic listening (Cherry, 1953)

Shadow and repeat information stream in one ear. Ignore the other.



Filtering

- The problem with cocktail parties...



Cocktail party effect



- 3 properties:
 - Ability to select one information stream.
 - Ability to *covertly* attend to another stream.
 - Higher sensitivity to words of interest

summary

- Limited capacity
 - “bottleneck” in processing
- Able to selectively attend to goal relevant information
 - Overtly (eye-movements), but also covertly
 - Domain general (e.g., vision, audition)
 - What is the mechanism for selection?

